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ABSTRACT

This field trip program consists of a 90-minute interpretive tour and a 90-minute hands-on workshop in which students learn about the process of making cloth both by hand and in a factory. The program focuses on the changing nature of work and the roles of workers. The tour and workshop complement one another by exploring different aspects of the transition from farm to factory. On the tour, students visit both a restored weave room with 88 operating power looms and the "Working People Exhibit" where they can examine what life was like outside the factory. In the workshop, students participate in two sets of activities: after an introduction to the mechanics of manual cloth production, students work in pairs and learn to weave on hand looms; one student remains at the loom to experiment with creating different weave patterns, while the other works in the "Discovery Area" stations. The program's activity guide presents the theme; lists program objectives; provides historical background; and enumerates pre- and post-visit activities. A glossary of terms concludes the guide. (BT)

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Bale to Bolt

Activity Guide

SO 031 205

Tsongas Industrial History Center

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Program Description

The Bale to Bolt program includes a 90-minute interpretive tour and a 90-minute hands-on workshop. Students learn about the process of making cloth both by hand and in a factory. The changing nature of work and the roles of workers are the focus. The tour and the workshop complement one another by exploring different aspects of the transition from farm to factory. On the tour, students discover firsthand the unique resources of Lowell and the Park. The hands-on workshop enhances the tour by bringing the significance of the historic resources to life.

During the interpretive tour, students visit both the restored "mill girl" boarding-house in the Working People Exhibit and the Booitt Cotton Mills Museum. By examining the industrial cloth manufacturing process, the tour focuses on the changing nature of work during the Industrial Revolution.

One highlight of the tour is a visit to a restored weave room with eighty-eight operating power looms. Standing among the roaring machines, students are challenged to consider the hazards of mill work, and worker response to these conditions.

Another tour highlight is a visit to the Working People Exhibit where students examine what life was like outside the factory. Here, they examine primary source records on the daily lives of nineteenth century working women.

In the workshop, students participate in two sets of activities. First, after an introduction to the mechanics of manual cloth production, students work in pairs and learn to weave on hand looms. Once students have had time to learn several weave patterns, one of the pair remains at the loom to experiment with creating different weave patterns.

The other member of the pair works in the Discovery Area stations. This segment gives students the opportunity to take a look at the changes in weaving brought about by changes in technology, experimenting with machinery, and collecting data.

Then these two groups switch activities--one group explores the discovery stations while the other group weaves. At the end of the workshop, students participate in a discussion concerning the similarities and differences between hand loom weaving and power loom weaving, and changes brought about by mechanization.

Student weavings are cut and mailed to the school within two weeks.

Theme & Objectives

Theme

The Industrial Revolution was a defining era in American history. All that we consider "modern" was significantly shaped by this period, whether it be in technology, politics, art, culture, or the nature of work itself.

The shift from craft production in the home to industrial production in factories was a fundamental part of the Industrial Revolution. Although the principal steps in the process of making cloth (carding, spinning, and weaving) remained the same, the nature of the work and the role of the worker changed dramatically.

Program Objectives

After visiting the Park and the Tsongas Center and completing the activities in this guide, students will be able to:

- *list the primary steps in the manufacture of cloth.*
- *summarize how mechanization transformed the weaving process.*
- *describe how changes in textile technology affected the role of the worker.*
- *identify, from their own perspectives, two major costs and two major benefits of the Industrial Revolution.*

Bale to Bolt

The Industrial Revolution. What does the expression mean to us today? What did it mean in the past? When did it begin? Has it ended? How did it change the world? Answers to these questions can be found through a historical exploration of the city of Lowell.

"Industrial Revolution" refers to the time when a society begins to use machinery instead of manual labor to produce basic goods. Not surprisingly, the textile industry has introduced this process in virtually every industrialized nation. The reasons are clear: Clothing is a basic need, and the market includes 100% of the population.

Farm to Factory: The Move to Industrialized Textile Manufacture

Before the Industrial Revolution, most people made cloth in their homes. The process was slow and laborious. Sheep had to be sheared, or cotton bought, then cleaned and straightened, before being spun into yarn and woven into cloth. Making cloth was one of the most time-consuming tasks in the lives of ordinary people, particularly women.

For Americans, this began to change with the introduction of the factory system in Waltham and Lowell, Massachusetts, in the early 1800s. For the first time in history, every stage of the cloth manufacturing process was performed under one roof in a large factory. The "integrated manufacturing process" truly revolutionized textile production.

Almost overnight, brightly colored woven fabrics appeared in shops throughout the country. Dazzling patterns, once reserved for the urban elite, became available at affordable prices in outlying districts. In many households, fancier calicos and twills replaced plain homespun.

Technological Innovation and Industrial Expansion

A series of technological innovations in manufacturing--particularly the power loom for mechanized weaving of low-to medium-grade cotton cloth--made expansion of the new factory system possible. The power loom was combined with power spinning frames and other machinery for carding, cleaning, washing, and dyeing. Each machine depended on materials produced by the other machines. If an improved design increased the production of one machine, a corresponding technological advance was needed for the other machines. To keep the system running efficiently, master mechanics then focused on improving the output and increasing the speed of the other machines.

The integrated manufacturing system was considered a marvel--almost beyond belief to contemporary observers. Scientists and social thinkers made predictions that machines would soon replace human labor altogether. "Toil and poverty will be no more among men, Nature affords infinite powers and wealth," trumpeted John Adolphus Etzler, a German engineer touring the United States in 1833. It seemed clear to most that the advent of the machine age was a good thing--a boon to humanity.

The Downside of the Dream

In Lowell, this dream proved hollow. If there ever was a Golden Age, it did not last long. Wealthy investors studied Lowell's factory system and realized that it could be duplicated wherever there was a large waterfall. Other water-powered textile cities sprang up throughout New England. Supply soon outpaced demand, and the price of cotton cloth went down. In an attempt to maintain a competitive edge and keep dividends high, companies replaced old machines with newer models.

While technological advances increased production, they also affected workers by speeding up the work pace. Automatic operation of the machinery, ostensibly to reduce operator errors, also meant that more machines could be tended by a single worker. "Speed-ups" and "stretch-outs" were common management practices designed to force workers to produce as many units of cloth per workday as possible, keeping profits high for the owners. This pattern of technological change led to tension between labor and management, and persisted throughout the 19th and 20th centuries.

Workers Fought Back

Unwilling to tolerate deteriorating working conditions, many mill workers fought back. In 1834 and 1836, female operatives, without political voice or representation, organized strikes ("turnouts"). To the surprise of many, the 1836 strike won limited concessions from ownership. In 1844, the Lowell Female Labor Reform Association began agitating for a ten-hour workday. This militant organization was formed and run exclusively by women workers. Legislators ignored their protests, however, because mill ownership had a stronger political voice.

In 1875, skilled male spinners went out on strike. They refused to ally themselves with unskilled workers, effectively excluding all women, and likewise excluding men from a variety of ethnic backgrounds. The strike failed. Mill owners skillfully exploited differences among workers to prevent successful strikes.

It was not until 1912 that all of Lowell's workers stood together against management. An outside group, the Industrial Workers of the World (IWW), organized workers without regard to skill, sex, or ethnicity. The strike was a major success.

Despite advances made for workers in 1912, the quest for improved working conditions continued. Mill work continued to be a demanding and often dangerous occupation. Although mill workers suffered many hardships, generations of workers endured the conditions, achieving self-respect through the skills they acquired and the quality of work they produced.

Pre-Visit Activities

1. Mechanization

Students today live in a world where machines do many tasks. This activity challenges students to think about how mechanization affects the way they live, and helps prepare them for the on-site experience.

Getting Started

Bring an electric egg beater or mixer, an egg, and a bowl to class.

Thinking about Mechanization

In class, beat the egg using the electric beater. Ask students if there is another method that could be used to accomplish this task. Encourage them to come up with several responses. Have the students evaluate each method for beating an egg. Which one do they prefer and why? As a class, discuss the term "mechanization" and create a working definition.

Investigating Mechanical Devices at Home

Have students each make a chart like the one below to help them investigate mechanical devices in the home. Complete the chart for homework. The next day, review the chart and discuss the responses, focusing on those in the Preference / Why column. Ask students what they think are the positive and negative effects of mechanization.

Task	*Machine / Tool*	*Alternative Method*	*Preference / Why*

2. What Is Cloth?

Students coming to the workshop spend time discussing the nature of cloth, focusing on woven fabrics. This activity prepares students by having them examine different types of cloth and looking at the similarities and differences in the way they are made.

Being a Cloth Detective

Have each student bring in at least two samples of different types of cloth (2" x 2"). Divide students into small groups. Have each group make a display of their fabric, including a chart showing the similarities and differences.

3. Using the Stephen Burleigh Taylor Family Letters

Part of the interpretive tour explores workers' lives. This activity allows students to focus on a specific mill worker, Barilla Adeline Taylor. Barilla left her family's farm in Maine in October of 1843, when she was fourteen years old. She worked as a weaver in Lowell's Hamilton Mills for two years. She died in Lowell on August 22, 1845, at age seventeen. Though the record of her death does not cite a cause, it is probable that she was a victim of brown lung or consumption.

Developing a Story Line

Have students read Passages from the Taylor Family Letters on pages 12-13. Working in small groups, students should develop a story line to portray what they think Barilla's life was like. To help them develop their story, pose the following questions:

- *What do you think Barilla's life was like in Roxbury, Maine?*
- *Why do you think Barilla decided to go to Lowell?*
- *What was difficult about leaving home?*
- *How do you think Barilla's family felt about her going to Lowell?*
- *Was Barilla happy in Lowell?*
- *What kinds of things do you think Barilla did in Lowell?*
- *What do you think Barilla dreamed of doing?*

Presenting the Story

Once students have developed their story line, have them present a skit for the class. If performance is not appropriate for your class, have each student write his/her own story based on the small-group discussions.

4. Different Views of Lowell

When your students visit Lowell, they will get a sense of what the industrial weave room environment was like, and will learn about Lowell's early years as a textile center. This activity helps them think about what Lowell might have been like in the 1840s. It also challenges them to think about why descriptions of the same city vary so widely.

Understanding and Explaining the Meaning of Another's Words

Divide the class into four groups. Assign each group one quote to read from Different Views of Lowell in the 1840s on page 14. Once they've read the quote, they should rewrite it in language that the whole class can understand, and then present an explanation to the class.

Writing an Article

Have the groups which studied the first and third quotes work together as group A, and the groups which looked at the second and fourth quotes form group B. Each group should act as a team of reporters from a newspaper, and write an article on Lowell in the 1840s. Make sure the team illustrates its article with pictures, and answers the following questions:

- *Who works in the city?*
- *What kind of work do they do?*
- *What does the city look like?*

Discussing Different Perspectives

Students should present their findings to the entire class, and debate whether it seems as if each group is describing the same place. As a class, discuss the different perspectives, and the ways in which the descriptions are similar and/or different.

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Post-Visit Activities

1. At Work in the Mills

While on the interpretive tour, students learned a lot about working conditions in textile factories. This activity encourages them to use their imaginations and writing skills to express their feelings about early 20th-century mill work.

Developing a Character

Have students imagine it is 1912, and they have been working in the weave room of the Boott Cotton Mills for one year. To help them develop their characters, pose the following questions:

- *What do you do in the weave room?*
- *Do you like your job? Why or why not?*
- *Do you like the people with whom you work? Why or why not?*
- *Where does your family live? How far is it from Lowell?*
- *Why did you come to Lowell?*
- *What do you expect to get from your experience in Lowell?*

Writing a Letter

Students should voice the sentiments of their character by writing a letter to a fictitious friend who knows nothing about Lowell or factory work. Letters should describe what it is like to work in the mills, and answer the questions below. In addition you may want students to include at least three terms from the list of terms on pages 15-16.

- *What do you do at work?*
- *Do you like your job? Why or why not?*
- *What don't you like about the weave room?*
- *Do you like your colleagues? The company for which you work?*
- *Do you want your friend to work in Lowell? Why or why not?*

Sharing Different Points of View

Allow students to share their thoughts with one another. You may want to post letters on the bulletin board or have students exchange letters. As a class, discuss the similarities and differences in the views presented in the letters.

2. Working in the Weave Room

When your students visited the Boott Cotton Mills Museum weave room, they heard a fragment of the noise that would have sounded when the mill was in operation. When they visited the workshop, they examined the changing role of the worker from pre-industrial America to today. This activity challenges students to think about the effects of working conditions on the worker and asks them to think about what working conditions they would consider optimal. Small groups are ideal for this activity.

Describing Conditions in a Weave Room

Have students list as many adjectives, similes, analogies, and/or metaphors as they can to describe the conditions in a weave room. Remind students of the size, scope, and noise of the Boott Cotton Mills Weave Room and the photographs they saw depicting weave rooms from the 18th century to today. Have students discuss and record what they think the weaver thought, felt, and did for each of the time periods.

Exploring Their Reactions

Once they have made a list of descriptions and ideas, have them think about their own reactions to the noise and the general working conditions. How did it make them feel? Again, challenge students to use metaphors and analogies to describe their feelings.

Presenting Their Findings

To share their descriptions and reactions with the class, students should present their findings using one of the options listed below.

- *Write a series of letters/journals/diary entries reflecting the working conditions from each time period.*
- *Design a role-play, skit, or newscast to demonstrate the working conditions and the changes experienced by the weavers.*
- *Create a visual display by making collages to show the changing role of the worker.*

Make sure each presentation includes some of the metaphors, analogies, adjectives, and similes students have brainstormed in their small groups. As a class, discuss the student presentations.

Formulating a Personal Opinion about Ideal Working Conditions

Have students think about what kind of job they would like to have. Assign each student the task of writing a one-paragraph description of their ideal job. When writing the paragraph, students should think about the following:

- *Why is this the job I want? What are the appealing qualities?*
- *What kind of working conditions do I want?*
- *Will other workers like these working conditions?*
- *What can I do to make sure I like where I work?*

3. Researching Technology

During the Bale to Bolt program students, investigated how changing technology affected the way in which cloth was produced. This activity helps students look at other changes in technology from the time of their grandparents to today.

Brainstorming a List

Have the class brainstorm a list of machines found in their homes that their grandparents would not have used. Discuss the list, focusing on how machines have changed the things we do in our homes and the ways in which we do them.

Investigating a Machine
Divide the class into investigative teams and have each team select one machine from the list to study. Develop a list of questions to research and have students conduct the research.

Investigative Reporting
To share their information with the class, each group should develop a news report. Be sure to have students write a script and include some visuals in the report. Videotape these investigative reports to create a short news broadcast.

4. Understanding Lowell's Connection to the Cotton Industry and Slavery in the South

Have your students read the following passages which illustrate differing views in 19th-century Lowell toward slavery.

Notice Posted Around Lowell Warning of an Upcoming Speech by George Thompson, an English Abolitionist, December 2, 1834

"Citizens of Lowell, arise! Look well to your interests! Will you suffer a question to be discussed in Lowell which will endanger the safety of the Union?--a question which we have not, by our constitution, any right to meddle with. Fellow citizens, shall Lowell be the first place to suffer an Englishman to disturb the peace and harmony of our country? Do you wish instruction from an Englishman? If you are free-born sons of America, meet, one and all, at the Town Hall, THIS EVENING, at half-past seven o'clock, and convince your Southern brethren that we will not interfere with their rights."

George Thompson Speaking in Lowell, December 3, 1834

"The slaves are your fellow men . . . they are your neighbors, and you are commanded to love them as yourselves, and to remember them in bonds as bound with them. They are your fellow citizens . . . declared to be so by your glorious Declaration of Independence. You supply the South, and therefore are connected with this trade of blood. You consume the produce of the South, and thus effectually promote the cause of oppression there. You are taxed to maintain the Slavery of the South. You are in the habit of giving up the slaves of the South who seek refuge amongst you. Your colored citizens are liable to be seized and sold, if they go to the South. You live under the same Constitution as the South, and are therefore bound to amend that constitution, if it be at present unjust in any of its parts."

- *Have students portray several individuals in Lowell, 1834, who might have had strong feelings toward Mr. Thompson's speech (mill agents, abolitionists, weavers, merchants, investors in mills, parents of young men, etc.) What are their reactions to Thompson's views?*

- *Simulate a debate, with students portraying Mr. Thompson and a pro-slavery advocate. Have the class act as reporters, investigating these differing views.*

- *Have students design a map showing the areas where cotton was grown, and the routes taken to transport the cotton to the North. (Common shipping routes were from Savannah, GA, to Boston and from Charleston, SC, to Boston.)*

Passages from the Taylor Family Letters

Barilla Taylor was one of twelve children in the family of Stephen and Melinda Taylor. She was born on June 29, 1828. In October of 1843, she left her home in Roxbury, Maine, to work as a weaver in the mills in Lowell, Massachusetts. She was fourteen years old. What follows are passages from letters written during her stay in Lowell. Many words are not spelled correctly. They appear here as we found them in the original letters.

George Dana Austin to Barilla Taylor*
June 23, 1844

Barilla don't you think of going home at all this fall because you must pass it through your head that there is just nobody there. . .

Barilla to Her Parents*
Sunday, July 14, 1844

It is with pleasure that I seat myself this morning to write you to let you know of my health which is very good at present . . . I like in the mill, but my overseer is not the best, or--I might say, the cleverest. I do not make much. I did not make only six dollars & a quarter last month beside my board. I pay five dollars for my board a month . . . I have changed my boarding place again . . . The first place I went to was on the Corporation. It was a very good place indeed. They kept about thirty boarders all the time . . . six in one room. Else had some trouble with the girls she roomed with & she would not stay. We went to the second place. Our boarding woman . . . was cross, lazy and nasty . . . In the morning she would get up, build up a fire & go to bed again. We would get up, get our breakfast & go into the mill . . . When we came out for dinner we would have what coffee was left from the morning for dinner. We would have a little dry bread, a cracker or two a piece & that was our dinner. We would have a piece of pie once a week & that was our living for about three months. I was sick there & I don't wonder, do you? I left there in about a week after I got able to work. I now board with Mr. & Mrs. Elston on Central Street. They are first rate folks . . . I have as much as I want and just when I want it . . . Ann Graham, if you know her, has got her hand tore off, It was done in the card room. I heard she has got to have it taken off above her elbow. We don't know but she will lose her life by it . . . If I stay till spring--I think it a doubt you will ever see me again if my health is as good as it is now for I think of . . . going to the west next spring . . . I bid you all farewell as I don't know as I shall ever see any of you again . . .

Mrs. Taylor to Barilla*
August 1st, 1844

. . . We heard you was in Boston the fourth of July and told Freeman Smith you was coming home in the fall We shall look for you at the time you promised to come home when you went away. Florena wants you should come home and help her for she has got a great deal to do . . . come home and go to school . . .

Florena Austin to Barilla Taylor*
January 27, 1845

. . . Mother says you did not come home last fall as you agreed and you must be sure to come next spring and stay with her next summer and make some woolen clothes, get rested and go again if you want next fall. I think one year is long enough to stay at a time. I do not approve of girls staying in the factory till they get all run down and good for nothing . . .

Mr. Taylor to Joseph C. Taylor*
August 25, 1845

. . . we was glad to hear that Barilla was alive though the next news may be her death news but we hope not. We all hope that she will get well and come home and see the folks . . .

Pliny Tidd to Mr. Taylor*
March 5, 1846

. . . I have had Barilla moved to the cemetery at Lowell on the 14th of November 1845. Also the stones put up . . . they are good strate stones and engraved in good taste . . .

*** Name Key**

George Dana Austin was a family friend and brother of Amos Austin. Amos Austin was married to Barilla's sister Florena.

Florena Austin was Barilla's sister. She was five years older than Barilla. She was married and had one child when Barilla was in Lowell. She stayed on the farm and eventually had five children.

Mr. Taylor was Barilla's father, Stephen Burleigh Taylor . He was 46 in 1843. In December of 1844, he became lame from an accident in which his horse got spooked and the wagon in which he was riding overturned. He owned a small farm.

Mrs. Taylor was Barilla's mother, Melinda Taylor . She had twelve children. Her youngest was born in 1846.

Joseph Taylor was Barilla's older brother. He was two years older than she. He left the family farm many times. Work was hard to find. He farmed for people around Boston, and at one point joined the circus. He took care of Barilla during her final days.

Pliny Tidd was a friend of Barilla's. It is likely that they met while living in Lowell.

Different Views of Lowell in the 1840s

Use these quotes to learn more about how different people who visited Lowell in the 1840s felt about what they saw.

• *"I believe there is no other place where there are so many advantages within the reach of the laboring class of people, as exist here; where there is so much equality, so few aristocratic distinctions, and such good fellowship, as may be found in this community."*

Lowell Offering
a journal written and edited by female workers
1841

• *"The mistaken impression went abroad that a paradise of work had at last been found. Romantic young women came from a distance with rose colored pictures in their mind of labor turned pastime, which were doomed to be sadly blurred by disappointment."*

Lucy Larcom
Lowell "mill girl"
1881 (writing about the 1840s)

• *"These girls [mill workers] . . . were healthy in appearance, many of them remarkably so, and had the manners and deportment of young women: not of degraded brutes of burden."*

Charles Dickens
famous British author
1842

• *"Aristocratic strangers . . . with their imaginations excited by the wonderful stories of Factory Life, have paid hasty visits to Lowell . . . To these nice visitors, everything in and around a Lowell Cotton Mill is bathed in an atmosphere of rose-colored light."*

Voice of Industry
journal written by and for working people
1847

Terms

agent - *A man hired by a mill owner to run a mill.*

bale - *Cotton that was strapped together into large packages called bales. Each weighed about 500 pounds.*

beater - *Frame on the front of a loom that moves back and forth, beating the weft into place.*

bell system - *Large bells on top of tall towers rang many times each day, telling workers when to begin or end activities, such as eating or working.*

boardinghouse - *A large dormitory-style building built and owned by the mill owners. Factory workers lived there.*

bobbin - *Yarn is wrapped around this and placed inside a shuttle that carries the weft thread through the shed.*

bolt - *When cotton has been made into cloth, the finished cloth is wound into rolls called bolts.*

carding - *Combing cotton to straighten the strands. This must be done before the cotton can be spun into thread.*

cloth beam - *A rotating beam on the front of the loom around which the woven cloth is rolled.*

corporation - *A company which makes cotton cloth or other products. In Lowell, each corporation owned several mill buildings.*

draft - *A map of the pattern you want to weave; made up of four parts: threading, tie-up, treadling, and draw-down.*

harnesses - *The rectangular frames hanging or resting inside the major frame of the loom; located behind the beater bar; threaded with warp threads.*

immigrant - *A person who leaves the country in which he or she was born to settle in a different nation.*

Industrial Revolution - *The period of time when people started to make products using machines, instead of making things by hand.*

loom - *A machine that weaves threads together to make cloth.*

mill girls - *Young women who were recruited to work in the mills in the early part of the Industrial Revolution. Most came from farms in New England.*

shed - *The space created between the upper and lower warp threads when the harnesses are raised or lowered; the space for the shuttle to carry the weft thread through the warp.*

shuttle - *The tool that carries the weft thread through the shed.*

speed-up - *Increase the speed of machinery in order to increase production.*

spinning - *Cotton or wool which has been carded is twisted and pulled until it becomes thread. This can be done by hand, on a spinning wheel, or by machine.*

stretch-out - *Increase the number of machines assigned to each worker with the intent of increasing production.*

strike - *When a large group of workers refuses to work, hoping to force their employer to give pay raises, improve working conditions, etc. Also called a "turnout."*

treadles - *Foot pedals that raise and lower the harnesses.*

union - *An organization which represents workers, helping them to bargain with their employer. If a union and an employer cannot agree on things like pay and working conditions, the union may organize a strike.*

warp - *The yarn attached to the loom, held under tension during the weaving process.*

warp beam - *A rotating beam on the back of the loom, around which the warp is rolled.*

weft - *Also called the woof, this is the horizontal thread, or the yarn running perpendicular to the warp.*

weaving - *One of the last steps in making cloth. Threads cross each other in an over and under pattern. Weaving is done with a loom.*